Date: ____________________________ Name: ________________________

Review of Grade 9-10 Math

Lines

1. Graph the lines

   a. $y = -\frac{3}{4}x + 5$

   b. $2x - 3y - 9 = 0$

   c. x =8

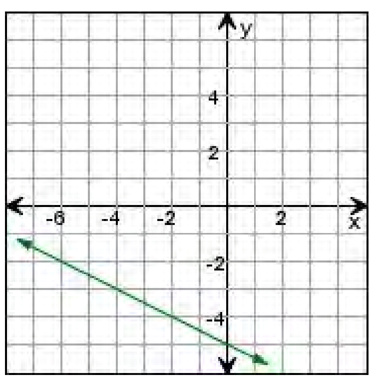
   d. y = -6

2. Find an equation for a line

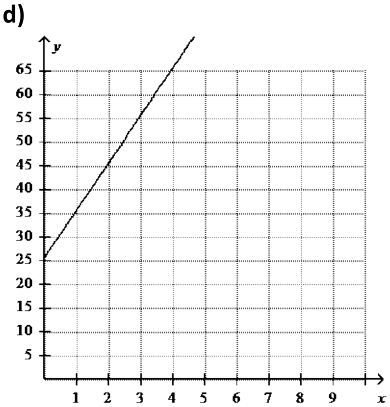
   a) with slope 6 passing through (–1, 4)

   b) that passes through (–5, 0) and (5, 6)

   c)



   d)



3. Find the x and y intercepts of $y = -2x + 3$
4. A line is perpendicular to 5*x* + 2*y* – 8 = 0 and has the same *y*-intercept as *x* + 4*y* – 12 = 0. Find an equation for the line.
5. Translate into mathematical symbols

   a. Brian's car costs him \$4000 plus \$0.20 per km every year. Write an expression for C, cost, to drive k, kilometers.

   b. Mike earns \$225 each week. Write an expression for E, earnings for w weeks

   c. Candace and Dino run computer repair services. For a service call, Dino charges \$50, while Candace charges \$40. In addition, they each charge an hourly rate. Dino charges \$30/h and Candace charges \$35/h. Write equations for both.

Algebra

6. Solve each equation.

a. $2x + 5 = 11$ b. $3m = m + 4$ c. $\frac{x}{5} - 1 = 4$ d. $5(2x - 3) = 2(x - 2) + 5$

e. $\frac{10}{8} = \frac{5}{x}$ f. $\frac{x+1}{3} = \frac{x-1}{5}$ g. $\frac{y}{2} = \frac{y}{3} - 1$ h. $\frac{5n}{2} = \frac{4n}{3} - \frac{7}{6}$

7. Simplify

a. $3 - 2x + x^2 - 7 + 5x$ b. $3x^2(2x)$ c. $\frac{6x^3y^5}{2x^2y^2}$ d. $\left(4y^3x\right)^2$

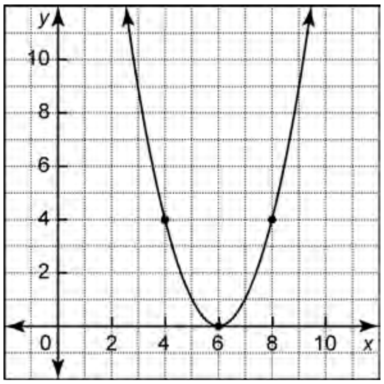
e. $3x \bullet 2x^3 \bullet 7x$ f. $x^3 + 4x^3$ g. $\frac{5ab^3}{10ab^2}$ h. $\left(-3ab^4c^3\right)^2$

Date: ____________________________ Name: ________________________

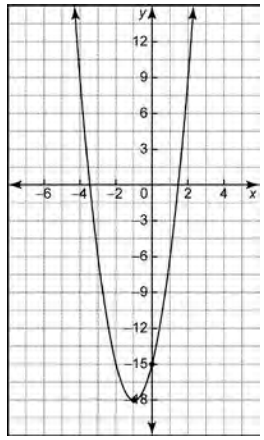
Quadratics

8. Find the equations of the following in all three forms (standard, factored, vertex)

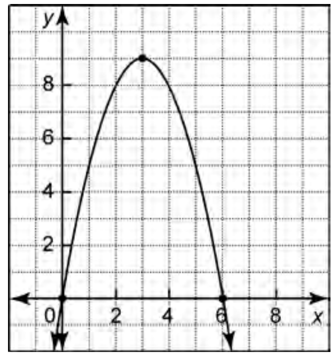
a.



b.



c.



9. Solve by factoring.

a) $5x^2 = -8x - 3$

b) $4z^2 = 1$

c) $10m^2 - 40m = 0$

d) $-18x^2 + 39x = -15$

10. Graph each of the following. (factor to find zeros, and then find the vertex)

a) $y = x^2 + 2x - 15$

b) $y = 4x^2 - 8x - 5$

11. Complete the square

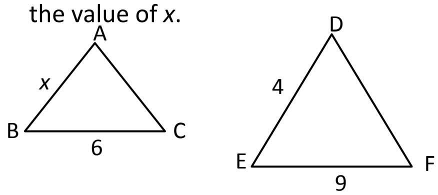
a) $y = -2x^2 + 8x + 5$

b) $y = \frac{1}{4}x^2 - \frac{1}{8}x + \frac{1}{4}$

12. State the equation for the arc in all three forms (factored/vertex/standard), given that the parabolic arc's legs are at 2m away and at 6 m away, and the arc's maximum height is 10m.
13. What is the maximum area that can be enclosed by 200m of fencing?
14. Determine two numbers whose difference is 12 and whose product is a minimum.
15. A bus company has 4000 passengers daily, each paying a fare of \$2. For each \$0.15 increase, the company estimates that it will lose 40 passengers per day. If the company needs to take in \$10450 per day to stay in business, what fare should be charged?
16. Jackie mows a strip of uniform width around her 25m by 15m rectangular lawn and leaves a patch of lawn that is 60% of the original area. What is the width of the strip?
17. A daredevil jumps off the CN Tower and falls freely for several seconds before releasing his parachute. His height, *h*, in meters, *t* seconds after jumping is given by $h = -4.9t^2 + t + 360$ before he released his parachute; and $h = -4t + 142$ after he released his parachute. How long after jumping did he daredevil release his parachute? How high was the jumper at this time?

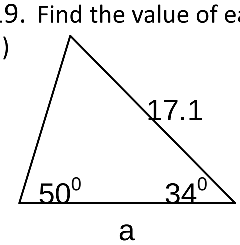
Trigonometry

18. Given $\Delta ABC \sim \Delta DEF$, determine the value of *x*.

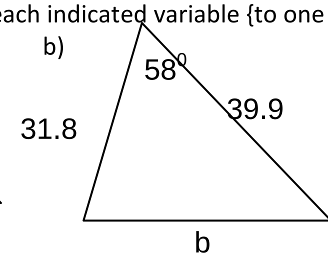


19. Find the value of each indicated variable {to one decimal place}

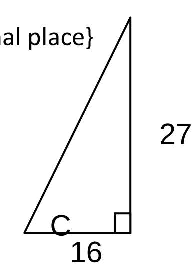
a)



b)



c)

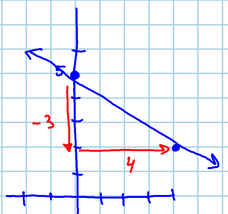


20. Teresa is at the top of her apartment building and is looking down at her friend Karin at a 50° angle of depression. The horizontal distance from the base of the building to Karin is 16 m. Determine the vertical height of the building.

STARTreviewANS

1 (a) $y = -\frac{3}{4}x + 5$

slope ↑ $\frac{-3 \text{ down}}{4 \text{ right}}$; ↑ y-int



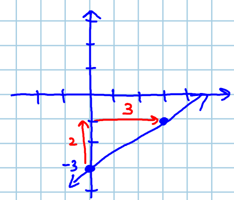
(b) $2x - 3y - 9 = 0$

isolate y

$2x - 9 = 3y$

$\frac{2}{3}x - 3 = y$

slope ; y-int



(c) $x = 8$ is a vertical line

(d) $y = -6$ is a horizontal line

2 (a) $y = mx + b$ $\quad m = 6 \quad (-1, 4)$ (x, y)

$4 = 6(-1) + b$

$4 = -6 + b$

$10 = b$

$\therefore y = 6x + 10$

2 (b) $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad (-5, 0) \; (5, 6)$ ($x_1\, y_1$; $x_2\, y_2$)

$m = \frac{6 - 0}{5 - -5}$

$m = \frac{6}{10}$

$m = \frac{3}{5}$

$y = mx + b$

$0 = \frac{3}{5}(-5) + b$

$0 = -3 + b$

$3 = b$

$\therefore y = \frac{3}{5}x + 3$

2 (c) from graph $\frac{\text{rise}}{\text{run}} = \frac{-1}{2}$

y-int $= -5$

$\therefore y = -\frac{1}{2}x - 5$

2 (d) from graph $\frac{\text{rise}}{\text{run}} = \frac{10}{1}$

y-int $= 25$

$\therefore y = 10x + 25$

3. $y = -2x + 3$

y-int → $\therefore (0, 3)$

for x-int sub $y = 0$

$0 = -2x + 3$

$-3 = -2x$

$\frac{3}{2} = x \quad \therefore \left(\frac{3}{2}, 0\right)$

4. $5x + 2y - 8 = 0$

isolate y to see m

$2y = -5x + 8$

$y = -\frac{5}{2}x + 4$

$\therefore m = -\frac{5}{2}$

$\therefore m_\perp = \frac{2}{5}$

$x + 4y - 12 = 0$

isolate y to see b

$4y = -x + 12$

$y = -\frac{1}{4}x + 3$

$\therefore b = 3$

$\therefore$ the equation is

$y = \frac{2}{5}x + 3$

5. (a) $C = 4000 + 0.20k$

(b) $E = 225w$

(c) Candace $C = 40 + 35h$

Dino $C = 50 + 30h$

6. (a) $2x + 5 = 11$

$2x = 6$

$x = 3$

(b) $3m = m + 4$

$2m = 4$

$m = 2$

(c) $\frac{x}{5} - 1 = 4$

$\frac{x}{5} = \frac{5}{1}$

$x = 25$

(d) $5(2x - 3) = 2(x - 2) + 5$

$10x - 15 = 2x - 4 + 5$

$8x = 16$

$x = 2$

(e) $\frac{10}{8} = \frac{5}{x}$

$10x = 40$

$x = 4$

(f) $\frac{x+1}{3} = \frac{x-1}{5}$

$5(x+1) = 3(x-1)$

$5x + 5 = 3x - 3$

$2x = -8$

$x = -4$

(g) $\frac{y}{2} = \frac{y}{3} - 1$

$\frac{y}{2} - \frac{y}{3} = -1$

$\frac{3y - 2y}{6} = -1$

$y = -6$

(h) $6 \times \frac{5n}{2} = 6 \times \frac{4n}{3} - \frac{7}{6} \times 6$

$15n = 8n - 7$

$7n = -7$

$n = -1$

7 (a) $x^2 + 3x - 4$

(b) $6x^3$

(c) $3xy^3$

(d) $16y^6x^2$

(e) $42x^5$

(f) $5x^3$

(g) $\frac{1}{2}b$

(h) $9a^2b^8c^6$

8 (a) can see one zero = vertex = $(6, 0)$ (h, k)

vertex form: $y = a(x - h)^2 + k$

$y = a(x - 6)^2 + 0$ $\quad$ sub pt $(8, 4)$ (x, y)

$4 = a(8 - 6)^2 + 0$

$4 = a(4)$

$1 = a$

$\therefore y = 1(x - 6)^2$ } same since zero = vertex

factored: $y = 1(x - 6)(x - 6)$

standard: FOIL

$y = x^2 - 6x - 6x + 36$

$y = x^2 - 12x + 36$

8(b) vertex $= (-1, -18)$ (h, k)

zeros $(-3.5, 0)$ and $(1.5, 0)$ approximated!

vertex

$y = a(x-h)^2 + k$

$y = a(x+1)^2 - 18$

sub pt $(0, -15)$

$-15 = a(0+1)^2 - 18$

$-15 = a - 18$

$3 = a$

use same a

$\therefore y = 3(x+1)^2 - 18$

factored

$y = a(x-r)(x-t)$

$y = 3(x+3.5)(x-1.5)$

Foil for standard

$y = 3(x^2 + 2x + 1) - 18$

$y = 3x^2 + 6x + 3 - 18$

$y = 3x^2 + 6x - 15$

To find exact zeros can use quadratic formula on standard form

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(3)(-15)}}{2(3)}$$

$x \doteq 1.45$ or $x \doteq -3.45$

8(c) vertex $= (3, 9)$ zeros $(0,0)$ and $(6,0)$

vertex $y = a(x-3)^2 + 9$ sub pt $(0,0)$

$0 = a(0-3)^2 + 9$

$0 = 9a + 9$

$-9 = 9a$

$-1 = a$

use same a

$\therefore y = -1(x-3)^2 + 9$

factored $y = a(x-0)(x-6)$

$\therefore y = -1x(x-6)$

standard expand

$y = -x^2 + 6x$

11(a) $y = -2x^2 + 8x + 5$

$y = -2(x^2 - 4x + 4 - 4) + 5$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$

$y = -2(x^2 - 4x + 4) - 4(-2) + 5$

$y = -2(x-2)(x-2) + 8 + 5$

$y = -2(x-2)^2 + 12$

11(b) $y = \frac{1}{4}x^2 - \frac{1}{8}x + \frac{1}{4}$

$y = \frac{1}{4}\left(x^2 - \frac{1}{2}x + \frac{1}{16} - \frac{1}{16}\right) + \frac{1}{4}$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-\frac{1}{2}}{2}\right)^2 = \left(-\frac{1}{4}\right)^2 = \frac{1}{16}$

$y = \frac{1}{4}\left(x^2 - \frac{1}{2}x + \frac{1}{16}\right) - \frac{1}{16}\left(\frac{1}{4}\right) + \frac{1}{4}$

$y = \frac{1}{4}\left(x - \frac{1}{4}\right)\left(x - \frac{1}{4}\right) + \frac{1}{64} + \frac{1}{4}$

$y = \frac{1}{4}\left(x - \frac{1}{4}\right)^2 + \frac{17}{64}$

9(a) $5x^2 = -8x - 3$

$5x^2 + 8x + 3 = 0$

$(5x+3)(x+1) = 0$

$\therefore 5x + 3 = 0$ $x + 1 = 0$

$x = -\frac{3}{5}$ $x = -1$

(b) $4z^2 = 1$

$4z^2 - 1 = 0$

$(2z+1)(2z-1) = 0$

$\therefore z = -\frac{1}{2}$ and $z = \frac{1}{2}$

9(c) $10m^2 - 40m = 0$

$10m(m-4) = 0$

$\therefore m = 0$ $m = 4$

10(a) $y = x^2 + 2x - 15$

$y = (x+5)(x-3)$

zeros $(-5, 0)$ and $(3, 0)$

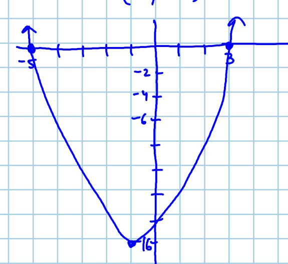
a.o.s $= \frac{-5+3}{2} = \frac{-2}{2} = -1$

opt. val $= (-1+5)(-1-3)$

$= (4)(-4)$

$= -16$

$\therefore$ vertex $(-1, -16)$



(b) $y = 4x^2 - 8x - 5$

$y = (2x+1)(2x-5)$

zeros $\left(-\frac{1}{2}, 0\right)$ and $\left(\frac{5}{2}, 0\right)$

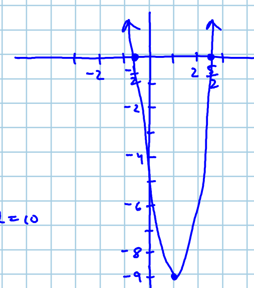
a.o.s $= \frac{-0.5 + 2.5}{2} = \frac{2}{2} = 1$

opt. val. $= (2(1)+1)(2(1)-5)$

$= (3)(-3)$

$= -9$

$\therefore$ vertex $(1, -9)$



12. zeros $(2,0)$ and $(6,0)$ opt. val $= 10$

a.o.s $= \frac{2+6}{2} = \frac{8}{2} = 4$

$\therefore$ vertex $(4, 10)$

vertex $y = a(x-4)^2 + 10$ sub pt $(2,0)$

$0 = a(2-4)^2 + 10$

$0 = a(4) + 10$

$-10 = 4a$

$-\frac{5}{2} = a$

$\therefore y = -\frac{5}{2}(x-4)^2 + 10$

factored $y = a(x-2)(x-6)$

$\therefore y = -\frac{5}{2}(x-2)(x-6)$

standard $y = -\frac{5}{2}(x^2 - 8x + 12)$

$y = -\frac{5}{2}x^2 + 20x - 30$

13. Fence = Perimeter = 200

$2l + 2w = 200 \rightsquigarrow 2l = 200 - 2w$

$l = 100 - w$

$A = lw$ to maximize is to find vertex of parabola not a parabola, unless sub in perimeter formula into the area formula

$A = (100 - w)w$

$A = 100w - w^2$

$A = -w^2 + 100w$ complete the square for vertex

$A = -(w^2 - 100w + 2500 - 2500)$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-100}{2}\right)^2 = (-50)^2 = 2500$

$A = -(w^2 - 100w + 2500) - 2500(-1)$

$A = -(w-50)(w-50) + 2500$

$A = -(w-50)^2 + 2500$

$\therefore$ vertex is $(50, 2500)$

analyze what vertex gives you usually point is (x, y) but here the variables are (w, A)

$\therefore$ width = 50
Area = 2500

15. Revenue = (Price)(quantity)

$10450 = (2 + 0.15x)(4000 - 40x)$

$10450 = 8000 - 80x + 600x - 6x^2$

$0 = -6x^2 + 520x - 2450$

$x = \frac{-520 \pm \sqrt{520^2 - 4(-6)(-2450)}}{2(-6)}$

$x = \frac{-520 \pm 460}{-12}$

$x = 5$ or $x \doteq 81.67$

since x represents # of times you change the price by \$0.15

The fare price $= 2 + 0.15x$

$= 2 + 0.15(5)$ or $= 2 + 0.15(81.67)$

$= 2.75$ $\quad$ $= 14.25$

realistic $\quad$ unrealistic (discard this one)

17. $h = -4.9t^2 + t + 360$

$h = -4t + 142$ sub in

$-4t + 142 = -4.9t^2 + t + 360$

$0 = -4.9t^2 + 5t + 218$

$t = \frac{-5 \pm \sqrt{5^2 - 4(-4.9)(218)}}{2(-4.9)}$

$t = \frac{-5 \pm \sqrt{4297.8}}{-9.8}$

$t = -6.2$ or $t = 7.2$

discard since time can't be negative

$\therefore$ He released his parachute 7.2 seconds into the fall.

14. let a and b be the two numbers

Difference = 12 $\quad$ Product = ab

$a - b = 12$ $\quad$ $P = ab$

$a = 12 + b$ $\quad$ $P = (12+b)b$

sub in to create a parabola $\quad$ $P = b^2 + 12b$

complete the square to find the minimum which occurs at the vertex

$P = b^2 + 12b + 36 - 36$

$\left(\frac{b}{2}\right)^2 = \left(\frac{12}{2}\right)^2 = 6^2 = 36$

$P = (b^2 + 12b + 36) - 36$

$P = (b+6)(b+6) - 36$

$P = (b+6)^2 - 36$

$\therefore$ vertex $(-6, -36)$

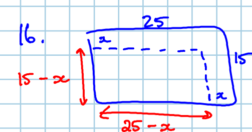
x y

b P

$\therefore$ one # is -6
product is -36

$\therefore$ the two #'s are -6 and 6

16.



Area of lawn $= 25 \times 15$
$= 375$

60% of area $= 375 \times 0.60$
$= 225$

Area left $= lw$

$225 = (25 - x)(15 - x)$

$225 = 375 - 25x - 15x + x^2$

$0 = x^2 - 40x + 150$

$x = \frac{40 \pm \sqrt{40^2 - 4(1)(150)}}{2(1)}$

$x = 35.8$ or $x = 4.2$

too big makes the dimensions negative discard

$l = 25 - x$ $\quad$ $w = 15 - x$

$l = 25 - 4.2$ $\quad$ $w = 15 - 4.2$

$l = 20.8$ $\quad$ $w = 10.8$

18. $\triangle ABC \sim \triangle DEF$ similar triangles means that ratios of sides are equal

$\frac{AB}{DE} = \frac{BC}{EF} = \cancel{\frac{AC}{DF}}$ don't need these

$\frac{x}{4} = \frac{6}{9}$

$9x = 24$

$x = \frac{24}{9}$

$x = \frac{8}{3}$

19ⓐ have a pair of opposites
∴ use Sine Law
but 1st find angle $A = 180° - 50° - 34°$
$A = 96°$

$$\frac{a}{\sin 96°} = \frac{17.1}{\sin 50°}$$

$$a = \frac{17.1 \sin 96°}{\sin 50°}$$

$a \doteq 22.2$

19ⓑ have SAS ∴ use cosine Law

$b^2 = 31.8^2 + 39.9^2 - 2(31.8)(39.9)\cos 58°$

$b^2 = 1258.50567831$

$b \doteq 35.5$

19ⓒ Since it's a right Δ can use SOH CAH TOA

27 is opposite angle C
16 is adjacent to angle C

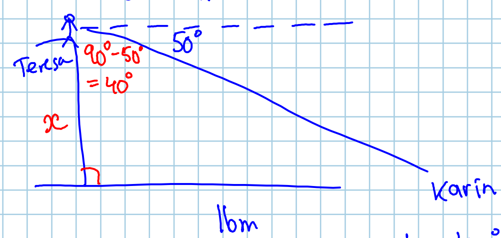
∴ use TOA

$$\tan C = \frac{27}{16}$$

$$C = \tan^{-1}\left(\frac{27}{16}\right)$$

$C = 59°$

20.



again TOA

$$\frac{\tan 40°}{1} = \frac{16}{x}$$

$x \tan 40° = 16$

$$x = \frac{16}{\tan 40°}$$

$x = 19.1$ m tall building